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IDENTIKIT

Get to know three more fascinating dinosaurs
CARNOTAURUS 241
MASSOSPONDYLUS 244
LAMBEOSAURUS 245

DINOSAUR WORLD

The life and times of the ...
REPTILES OF THE SEA 246

SPOTTER'S GUIDE

A quick peep at ... LEGS 254

TIME DETECTIVE

A Victorian view of *Iguanodon* in:
DOLLO'S DISCOVERIES 256
But that was then and this is now:
IGUANODON REBORN 258

HISTORY IN PICTURES

MARY ANNING
Professional fossil hunter 260

A to Z

Your alphabetical guide
Dacentrurus to *Deinocheirus* 264

ASK THE EXPERT

Cambridge University's Dr David Norman answers your dinosaur questions BACK COVER

PLUS

GIANTS OF THE PAST

The end is nigh for one plant-eater as *Carnotaurus* charges in 250

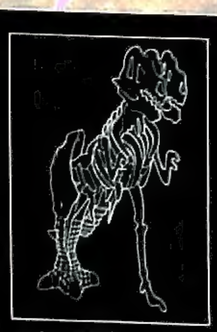
3-D Gallery

You won't believe your eyes – *Kritosaurus* lives in 3-D! 252

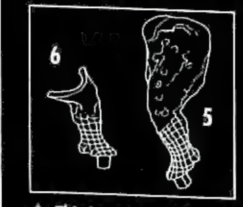
DINO Fact File

Quick questions to answer and fabulous facts to enjoy 262

HOW TO ASSEMBLE YOUR BODY MODEL

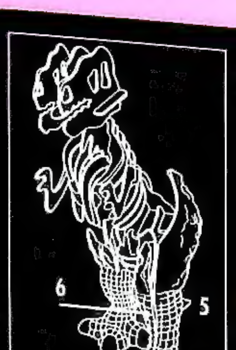


▲ Assembled model from Part 10



▲ This issue's model parts
Model part 5 – outside left leg
Model part 6 – inside left leg

With the body leg pointing forward, hold model parts 5 and 6 either side of the skeleton's left leg. Insert the pins on the outside left leg into the holes on the inside left leg. Push the completed leg down into the hole in the top of the left foot.



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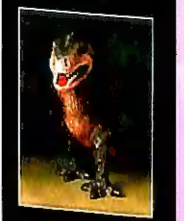

▲ Your completed *T rex* model

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CARNOTAURUS

This large predatory (hunting) dinosaur had a thick, powerful neck, a bull-shaped head and very short forearms for its size.

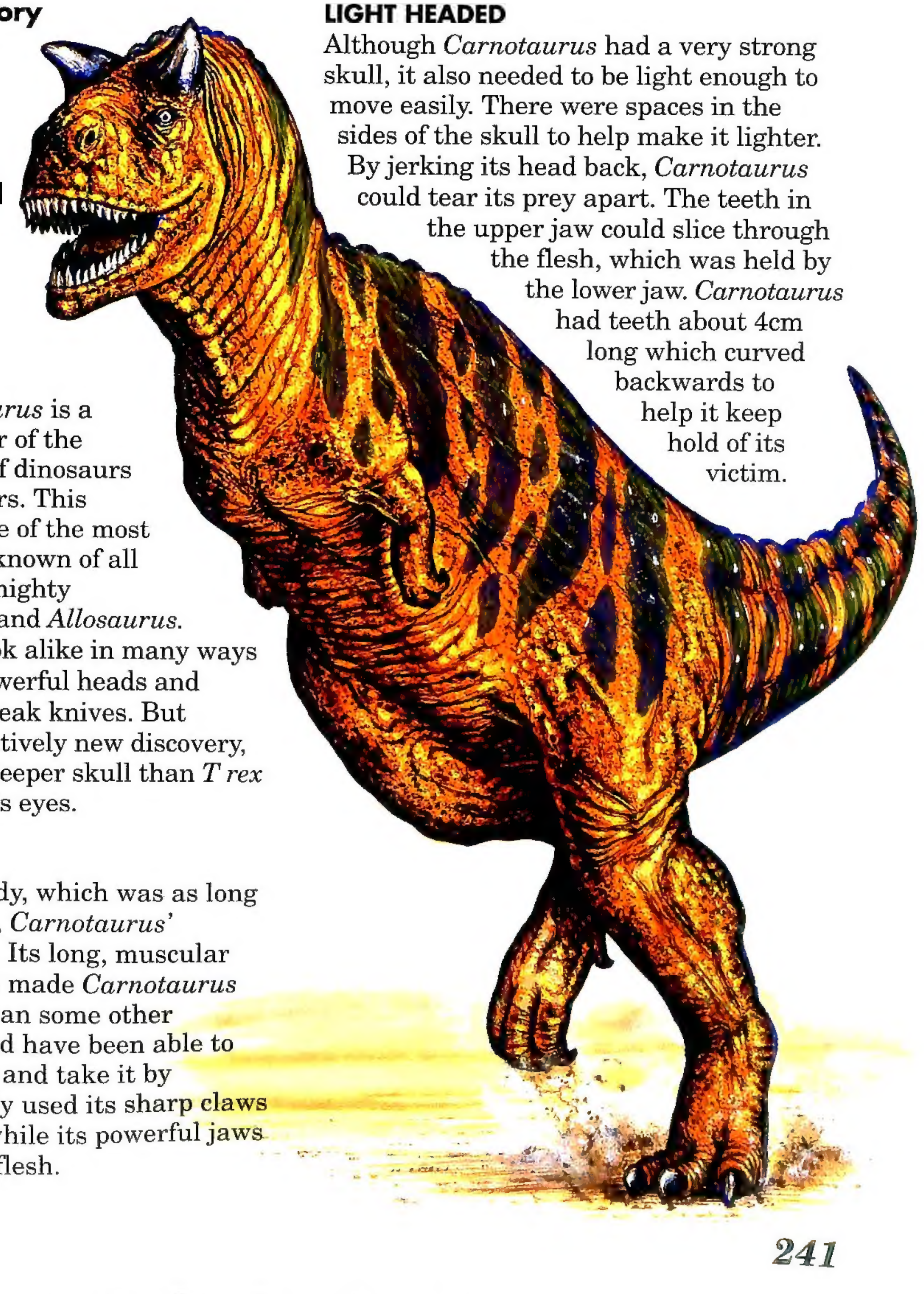
Carnotaurus is a member of the group of dinosaurs known as carnosaurs. This group includes some of the most fearsome and well-known of all dinosaurs such as mighty *Tyrannosaurus rex* and *Allosaurus*. These dinosaurs look alike in many ways with their huge, powerful heads and teeth as sharp as steak knives. But *Carnotaurus*, a relatively new discovery, had a shorter and deeper skull than *T rex* and hornlets over its eyes.

TINY ARMS

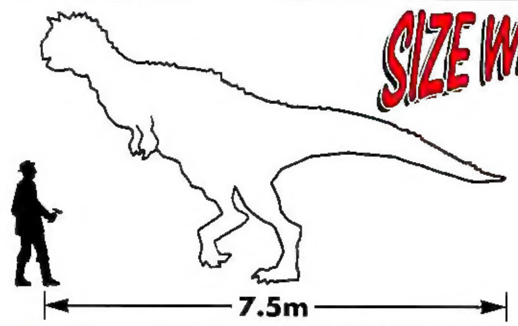
Compared to its body, which was as long as three small cars, *Carnotaurus'* forearms were tiny. Its long, muscular hind legs may have made *Carnotaurus* much more agile than some other carnosaurs. It would have been able to rush up on its prey and take it by surprise. It probably used its sharp claws to slash and grip, while its powerful jaws took out chunks of flesh.

LIGHT HEADED

Although *Carnotaurus* had a very strong skull, it also needed to be light enough to move easily. There were spaces in the sides of the skull to help make it lighter. By jerking its head back, *Carnotaurus* could tear its prey apart. The teeth in the upper jaw could slice through the flesh, which was held by the lower jaw. *Carnotaurus* had teeth about 4cm long which curved backwards to help it keep hold of its victim.



SIZE WISE



MONSTER FACTS

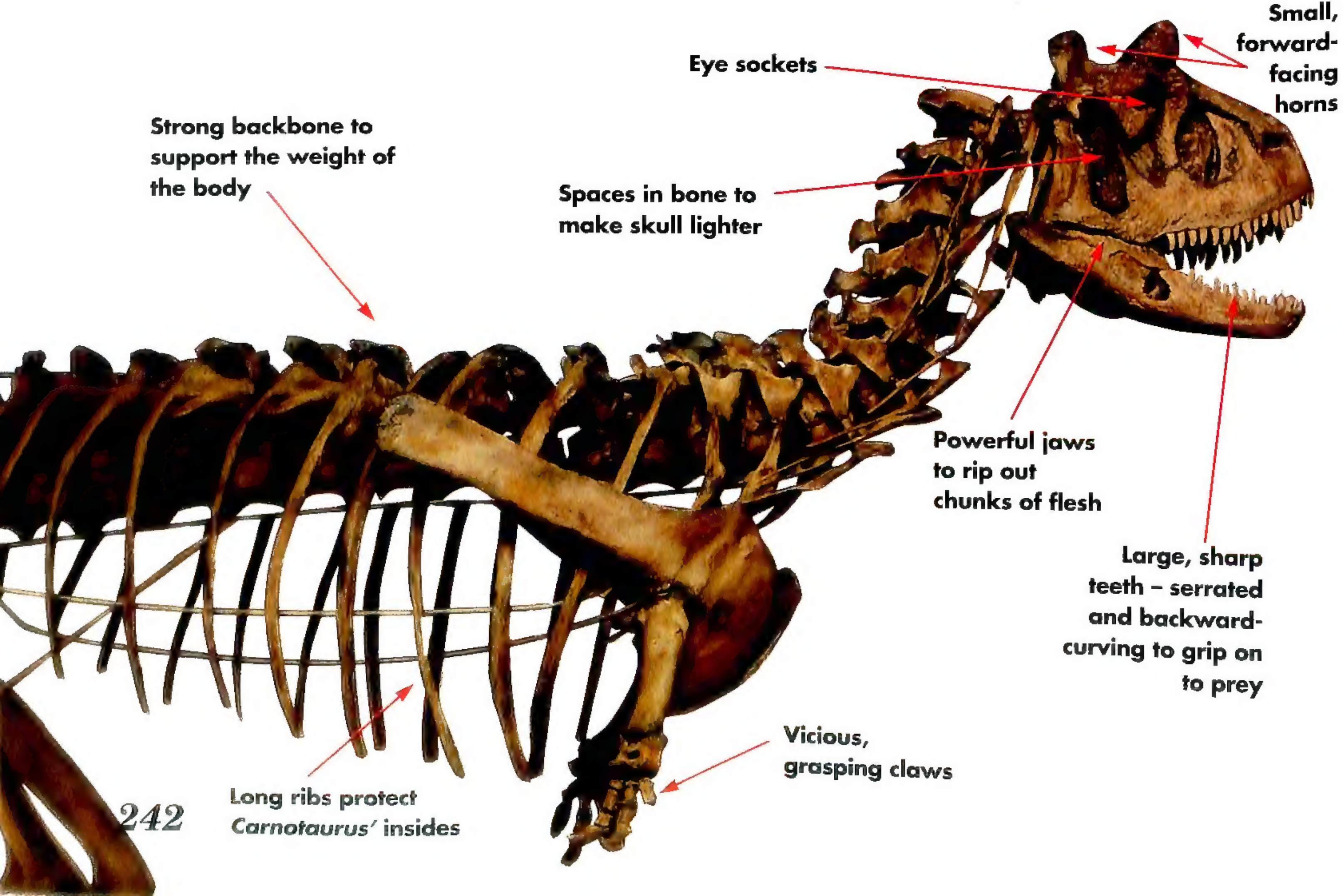
- **NAME:** *Carnotaurus* (carn-oh-taw-rus) means 'meat-eating bull'
- **SIZE:** 7.5m long and 3.5m high
- **FOOD:** meat – mainly other dinosaurs
- **LIVED:** 100 – 90 million years ago in the Middle to Late Cretaceous in South America

BUMPY SKIN

Carnotaurus was found in a vast area of grassland and semi-desert called Patagonia in Argentina in 1985. It was an exciting find because the remains gave scientists a very good idea of what this dinosaur's skin looked like. Along the surface of its body, from head to tail, there were rows of cone-shaped bumps. Rows of big, raised scales stood out from the smaller bumps on *Carnotaurus'* head, making a pattern around the eyes and on the upper part of its snout.

WELL BALANCED

Carnotaurus was as heavy as a car, almost as tall as an elephant and ran on two legs. Its long backbone was like a big girder supporting the weight beneath. Long rib bones from shoulder to hip gave *Carnotaurus* extra protection and support.



Eye sockets

Small, forward-facing horns

Strong backbone to support the weight of the body

Spaces in bone to make skull lighter

Powerful jaws to rip out chunks of flesh

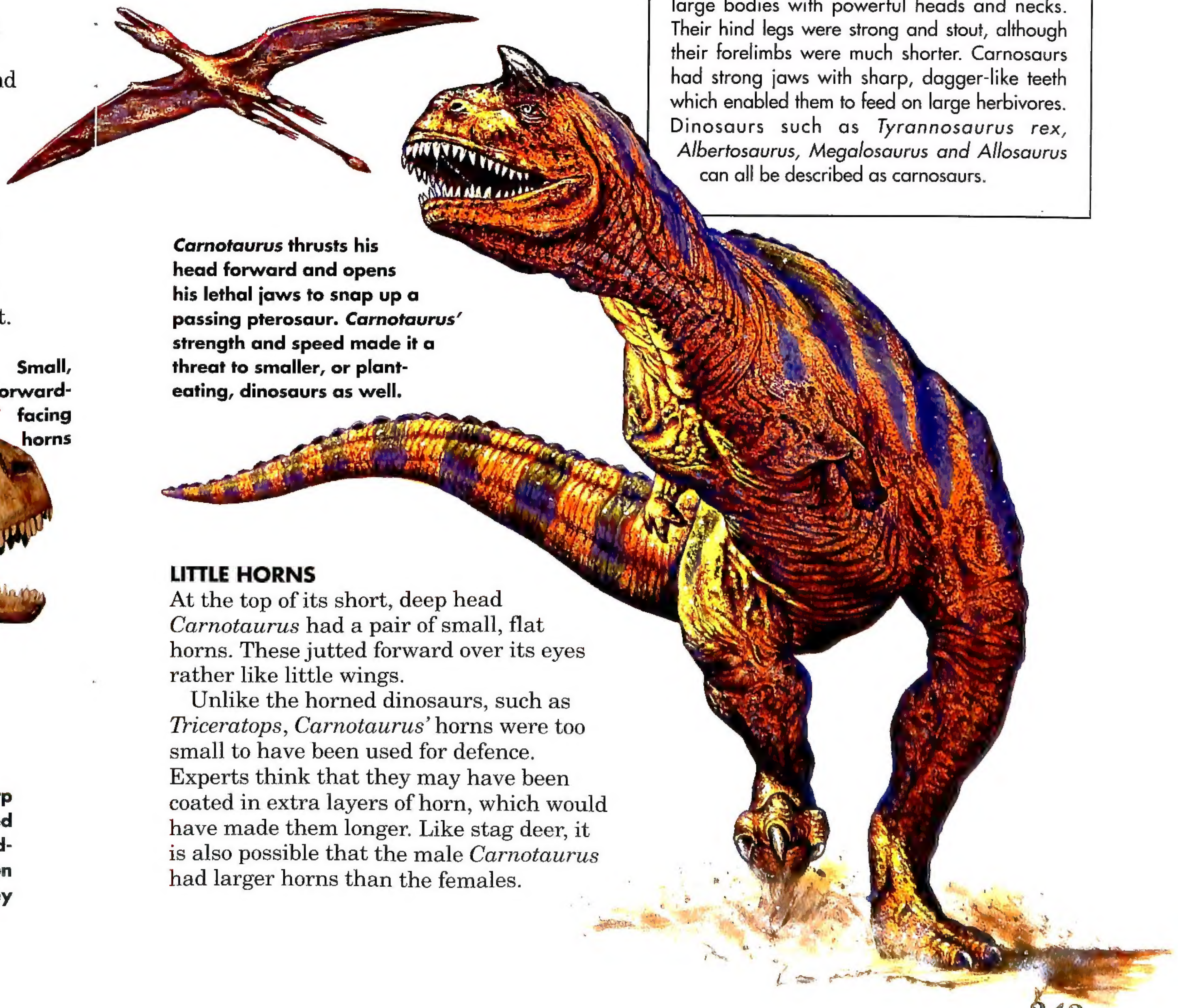
Large, sharp teeth – serrated and backward-curving to grip on to prey

Vicious, grasping claws

Long ribs protect *Carnotaurus'* insides

TAIL END

When *Carnotaurus* was moving at top speed it would have been unstable without its tail. *Carnotaurus* used its long, muscular tail to help to keep its balance. This enabled it to push its head forward to seize hold of its struggling prey.



***Carnotaurus* thrusts his head forward and opens his lethal jaws to snap up a passing pterosaur. *Carnotaurus'* strength and speed made it a threat to smaller, or plant-eating, dinosaurs as well.**

LITTLE HORNS

At the top of its short, deep head *Carnotaurus* had a pair of small, flat horns. These jutted forward over its eyes rather like little wings.

Unlike the horned dinosaurs, such as *Triceratops*, *Carnotaurus'* horns were too small to have been used for defence. Experts think that they may have been coated in extra layers of horn, which would have made them longer. Like stag deer, it is also possible that the male *Carnotaurus* had larger horns than the females.

What is? A CARNOSAUR

A carnosaur is the name given to several groups of meat-eating dinosaurs. This includes the large theropods which walked on two legs and had sharply clawed toes. They usually had large bodies with powerful heads and necks. Their hind legs were strong and stout, although their forelimbs were much shorter. Carnosaurs had strong jaws with sharp, dagger-like teeth which enabled them to feed on large herbivores. Dinosaurs such as *Tyrannosaurus rex*, *Albertosaurus*, *Megalosaurus and Allosaurus* can all be described as carnosaurs.

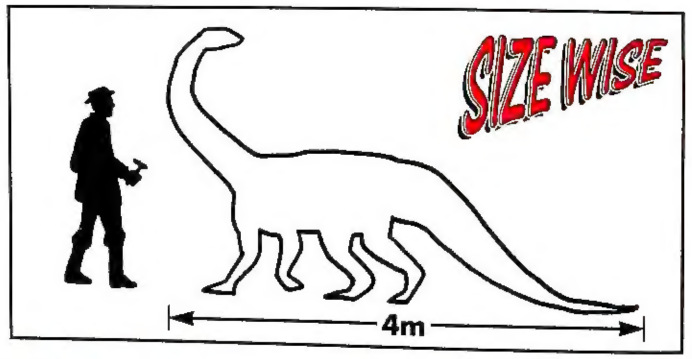
MASSOSPONDYLUS

Standing on its back legs, an adult *Massospondylus* could reach about as high as the top of a double-decker bus.

Massospondylus was one of the first plant-eating dinosaurs to appear on land. It had a small head and a long neck and tail. By tilting back on its hind legs it could reach shoots and leaves at the top of tall trees.

STOMACH STONES

Massospondylus had small teeth which could shred leaves, but they were not so good for chewing. When this dinosaur was discovered, small pebbles were found by its rib cage. Experts think *Massospondylus* may have swallowed these stones to help it digest its food. When food was swallowed, it was ground down by the stones. They worked like the blades of a food mixer to mash the leaves into a thick, mushy soup so that the dinosaur was able to absorb all the good things its large body needed.



MONSTER FACTS

- **NAME:** *Massospondylus* (mass-oh-spond-ih-lus) means 'massive vertebrae' (backbone)
- **SIZE:** 4m long
- **FOOD:** plants and leaves from trees
- **LIVED:** about 200 – 180 million years ago in the Early Jurassic Period in southern Africa and North America

BIG THUMB

To defend itself, *Massospondylus* had a huge thumb with a long, curved claw. Together with the second and third fingers, the thumb may also have been used for grasping things. The other two fingers were small and weak.

LAMBEOSAURUS

***Lambeosaurus* had a toothless beak and a strange-looking crest on its head.**

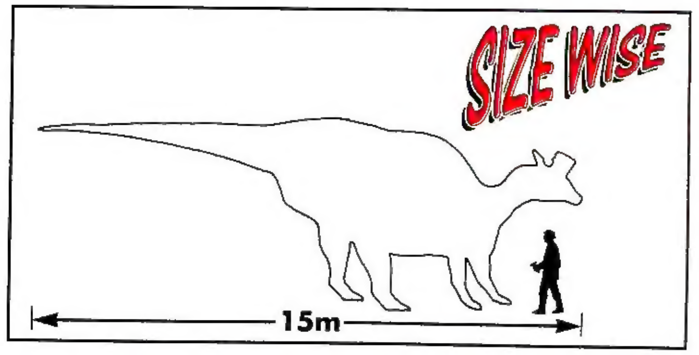
This plant-eating dinosaur had pebbly skin with scales that fitted together like a mosaic. *Lambeosaurus* usually walked on four feet, but when scared it ran off on its powerful hind legs. It relied on its sharp eyes and good hearing to sense danger.

MYSTERY CREST

Lambeosaurus had a crest shaped like a mitten with a bony spike as the thumb. As males had larger crests, it may have been a way to tell them apart from females. Some experts think the crest was used as a 'snorkel' if *Lambeosaurus* went under water. It is more likely that it was used to make sounds. One scientist discovered that, as air moved through the crest of a similar dinosaur, it sounded like a medieval horn. So, *Lambeosaurus* could have had its own distinctive call.

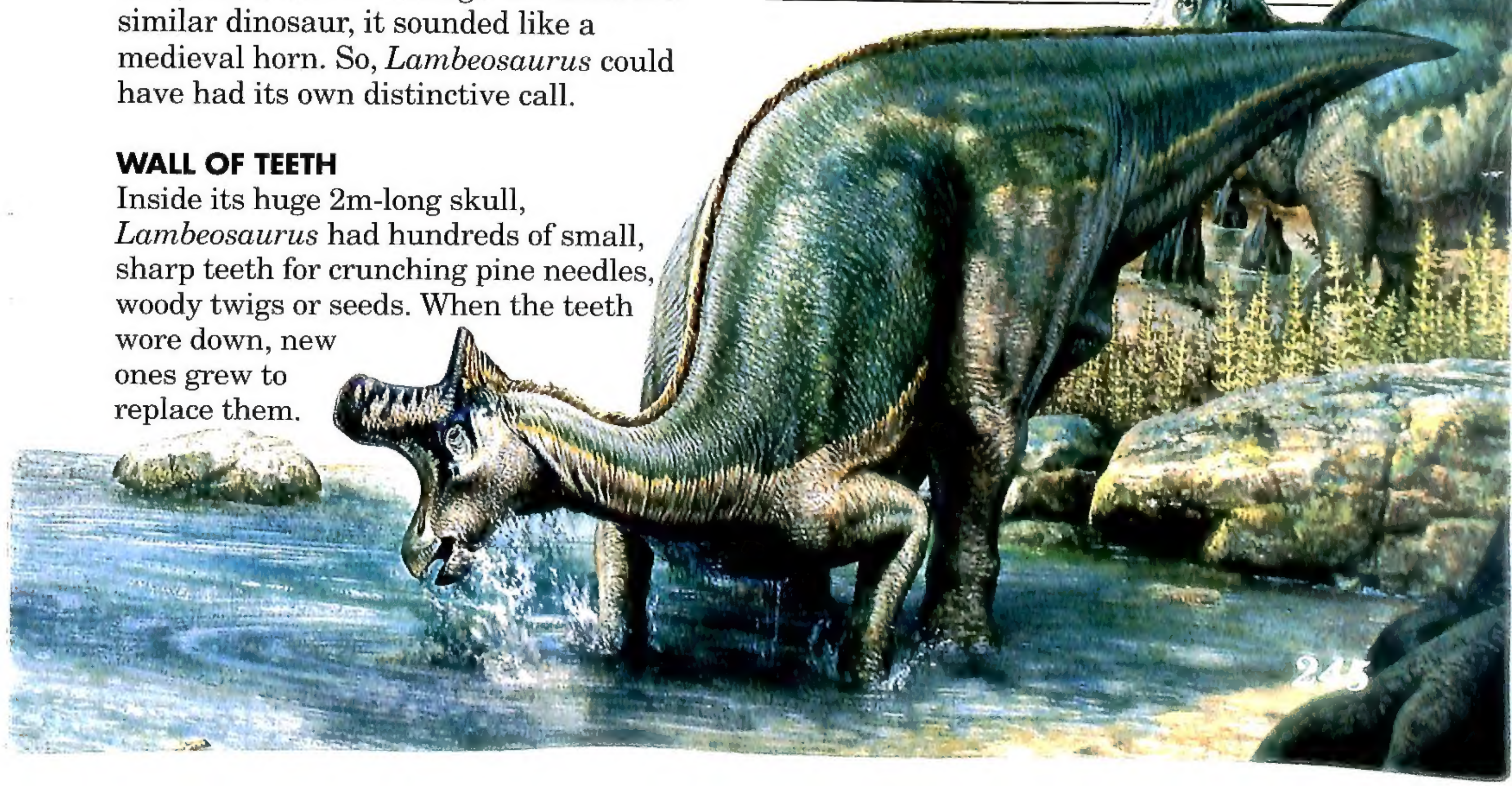
WALL OF TEETH

Inside its huge 2m-long skull, *Lambeosaurus* had hundreds of small, sharp teeth for crunching pine needles, woody twigs or seeds. When the teeth wore down, new ones grew to replace them.



MONSTER FACTS

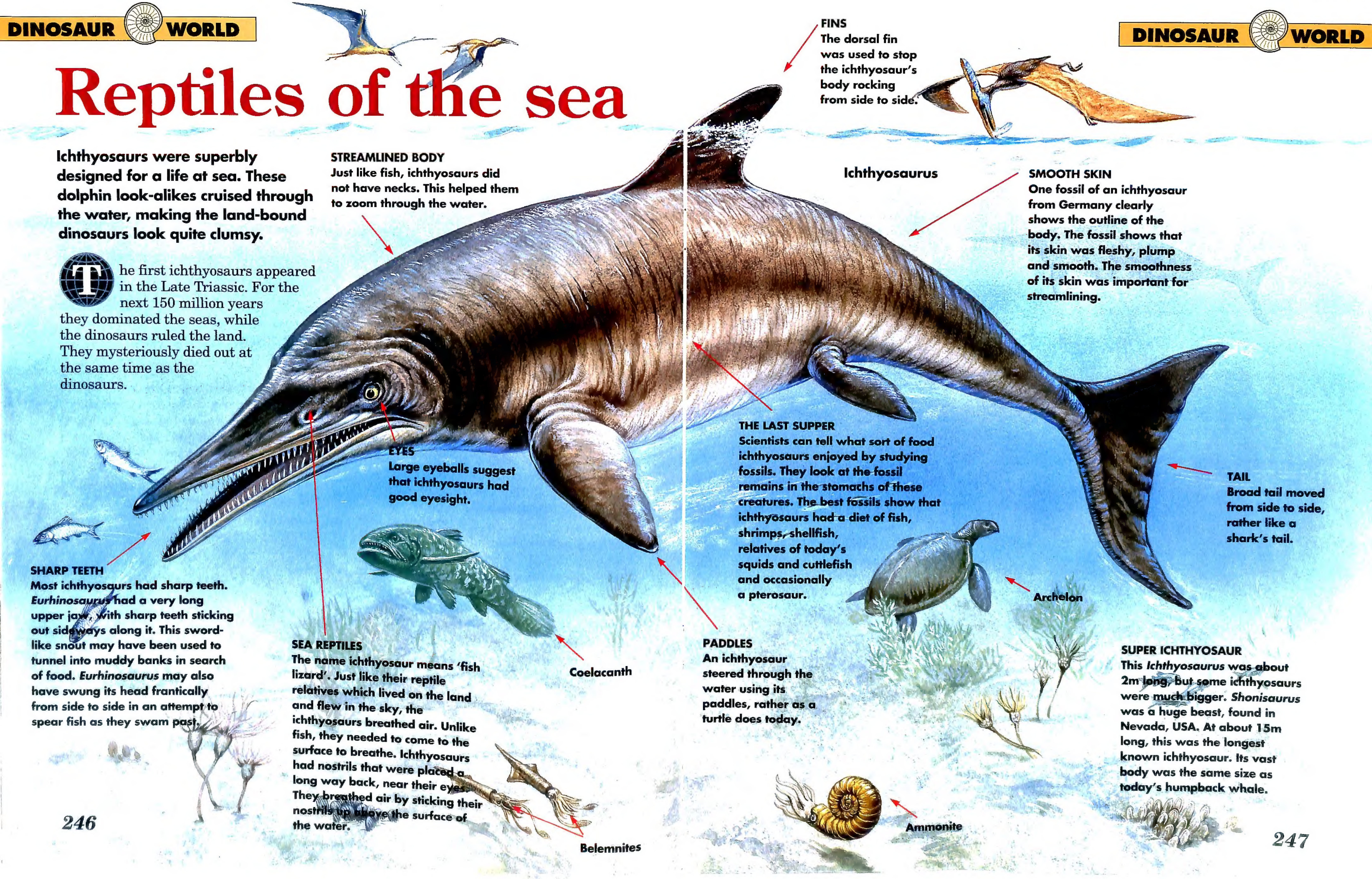
- **NAME:** *Lambeosaurus* (lam-bee-oh-saw-rus) means 'Lambe's dinosaur' after the Canadian palaeontologist, Lawrence Lambe
- **SIZE:** 15m long
- **FOOD:** leaves and other parts of plants
- **LIVED:** 70 – 66 million years ago in the Late Cretaceous Period in Alberta, Canada. Also in the USA and Mexico



Reptiles of the sea

Ichthyosaurs were superbly designed for a life at sea. These dolphin look-alikes cruised through the water, making the land-bound dinosaurs look quite clumsy.

The first ichthyosaurs appeared in the Late Triassic. For the next 150 million years they dominated the seas, while the dinosaurs ruled the land. They mysteriously died out at the same time as the dinosaurs.



STREAMLINED BODY
Just like fish, ichthyosaurs did not have necks. This helped them to zoom through the water.

FINS
The dorsal fin was used to stop the ichthyosaur's body rocking from side to side.

SMOOTH SKIN
One fossil of an ichthyosaur from Germany clearly shows the outline of the body. The fossil shows that its skin was fleshy, plump and smooth. The smoothness of its skin was important for streamlining.

EYES
Large eyeballs suggest that ichthyosaurs had good eyesight.

THE LAST SUPPER
Scientists can tell what sort of food ichthyosaurs enjoyed by studying fossils. They look at the fossil remains in the stomachs of these creatures. The best fossils show that ichthyosaurs had a diet of fish, shrimps, shellfish, relatives of today's squids and cuttlefish and occasionally a pterosaur.

TAIL
Broad tail moved from side to side, rather like a shark's tail.

SHARP TEETH
Most ichthyosaurs had sharp teeth. *Eurhinosaurus* had a very long upper jaw, with sharp teeth sticking out sideways along it. This sword-like snout may have been used to tunnel into muddy banks in search of food. *Eurhinosaurus* may also have swung its head frantically from side to side in an attempt to spear fish as they swam past.

SEA REPTILES
The name ichthyosaur means 'fish lizard'. Just like their reptile relatives which lived on the land and flew in the sky, the ichthyosaurs breathed air. Unlike fish, they needed to come to the surface to breathe. Ichthyosaurs had nostrils that were placed a long way back, near their eyes. They breathed air by sticking their nostrils up above the surface of the water.

PADDLES
An ichthyosaur steered through the water using its paddles, rather as a turtle does today.

SUPER ICHTHYOSAUR
This *Ichthyosaurus* was about 2m long, but some ichthyosaurs were much bigger. *Shonisaurus* was a huge beast, found in Nevada, USA. At about 15m long, this was the longest known ichthyosaur. Its vast body was the same size as today's humpback whale.

EARLY SWIMMING

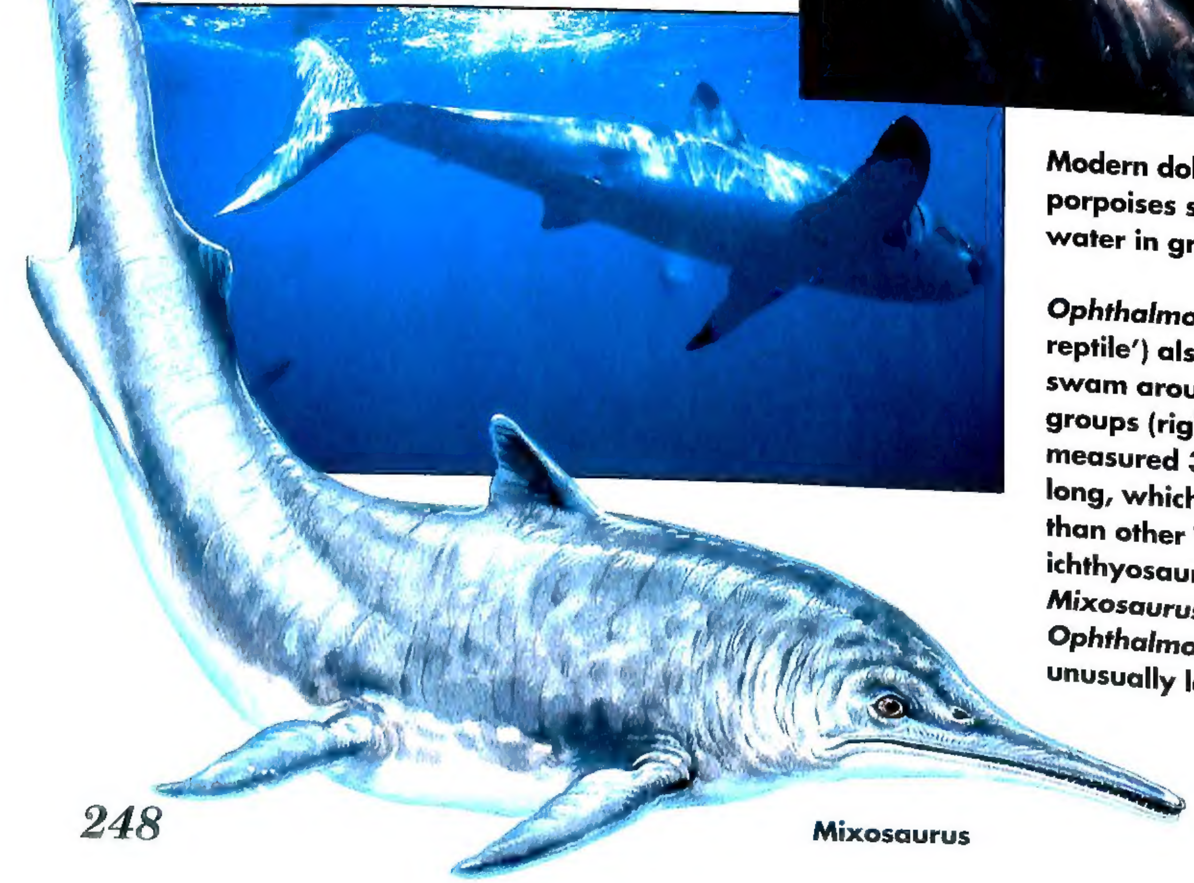
The only clue we have to early ichthyosaurs is a skull of an animal called *Grippia*. Just five million years after *Grippia*, an animal called *Mixosaurus* evolved. This early ichthyosaur had a slender body, small paddles and a narrow tail.

GETTING ABOUT

Ichthyosaurs swam by moving their tails from side to side, like sharks or tuna fish. They used their paddles to steer through the water. These sea reptiles may have reached speeds of 40 km/h or more.

Ichthyosaurs used the fin on their backs (dorsal fin) to keep their bodies straight. Without this fin, they would have been unstable in the water. Surfboards and sailing boats have similar fins underneath them to stop them rocking from side to side.

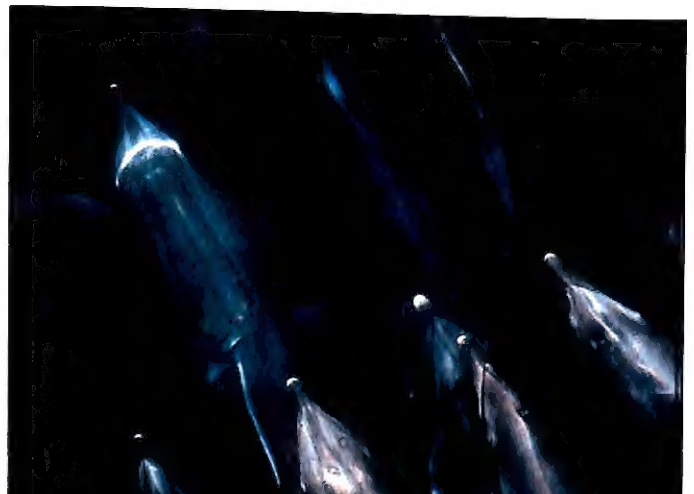
***Mixosaurus* (bottom) had a slender tail. Later ichthyosaurs had broader tails, rather like those of today's sharks (below).**



Mixosaurus

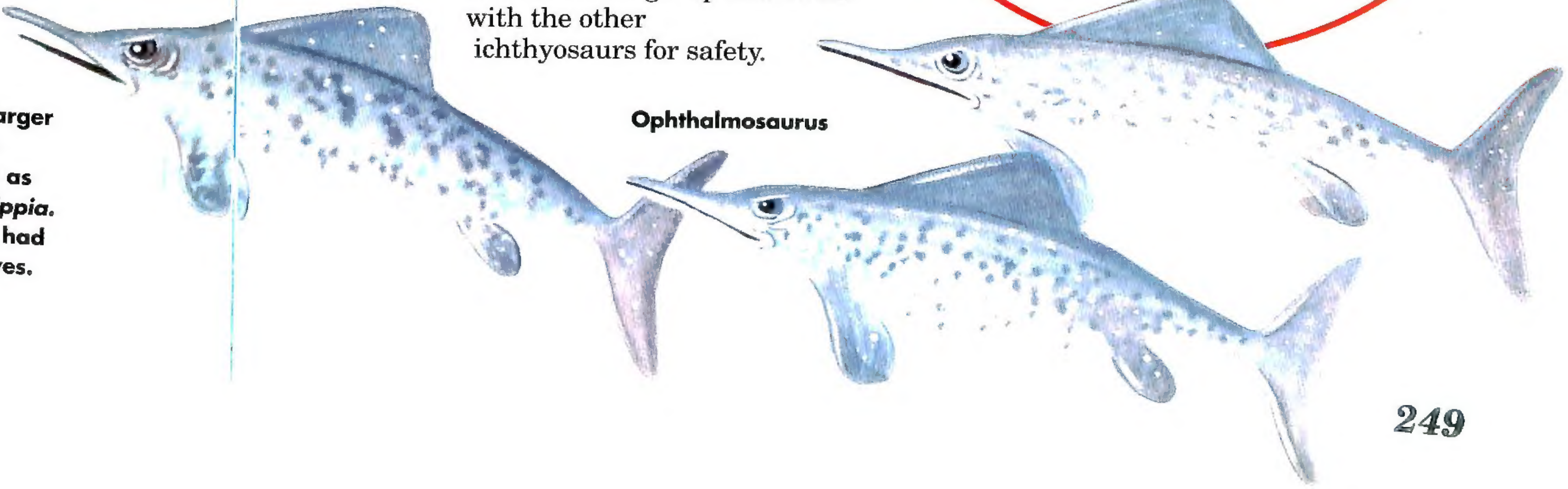
What is? STREAMLINING

Boats are a sleek and pointed shape to help them cut through the water. This is called streamlining. Boat designers make sure that the part of the boat in the water is smooth. This lets the boat move as fast as possible. In the same way, the water flows easily around the streamlined shape of these bottlenose dolphins (below) as they speed through the water.

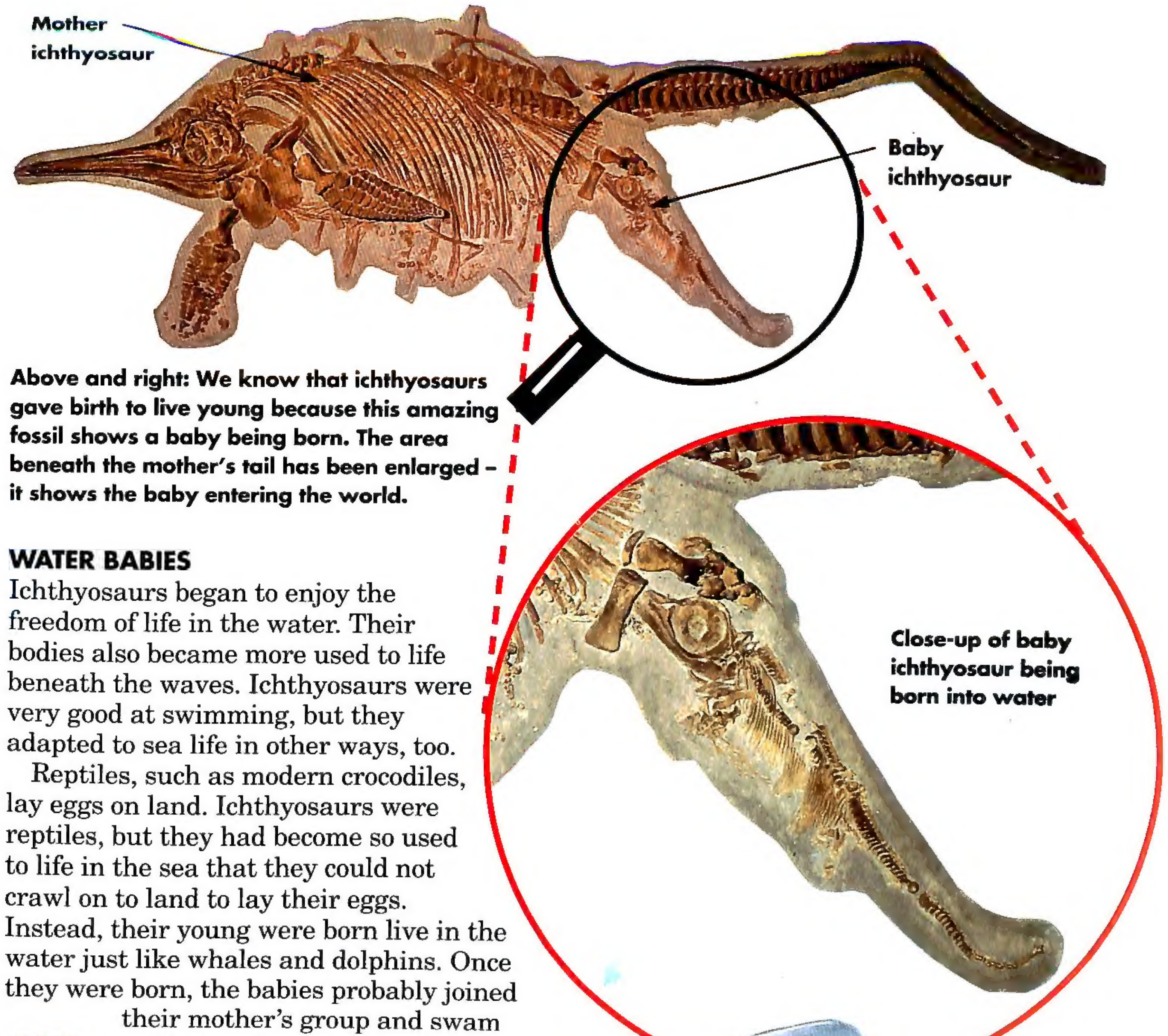


Modern dolphins (above) and porpoises speed through the water in groups.

***Ophthalmosaurus* ('eye reptile') also swam around in groups (right). It measured 3.5m long, which was larger than other Triassic ichthyosaurs, such as *Mixosaurus* or *Grippia*. *Ophthalmosaurus* had unusually large eyes.**



Ophthalmosaurus



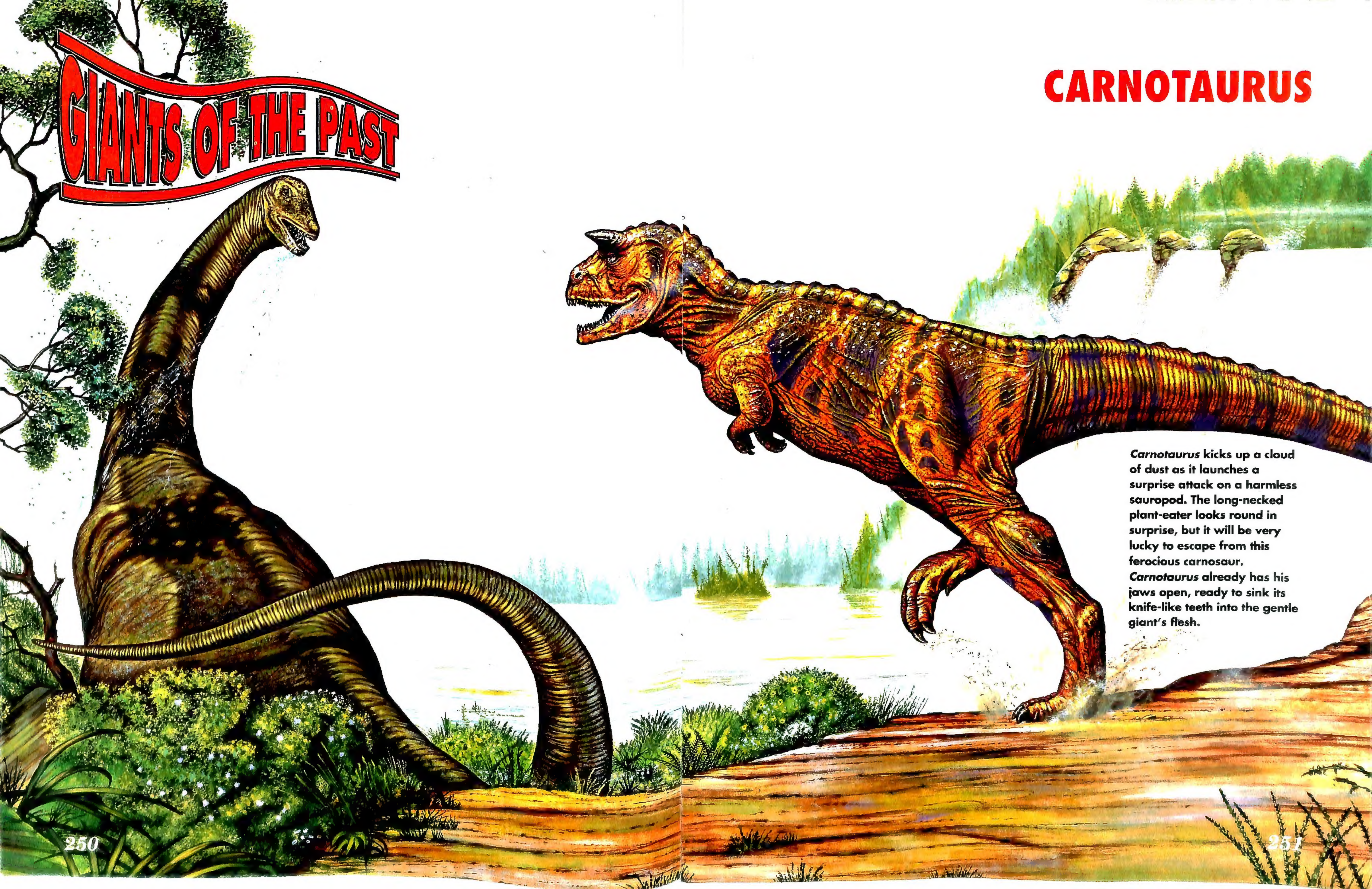
Above and right: We know that ichthyosaurs gave birth to live young because this amazing fossil shows a baby being born. The area beneath the mother's tail has been enlarged – it shows the baby entering the world.

WATER BABIES

Ichthyosaurs began to enjoy the freedom of life in the water. Their bodies also became more used to life beneath the waves. Ichthyosaurs were very good at swimming, but they adapted to sea life in other ways, too.

Reptiles, such as modern crocodiles, lay eggs on land. Ichthyosaurs were reptiles, but they had become so used to life in the sea that they could not crawl on to land to lay their eggs. Instead, their young were born live in the water just like whales and dolphins. Once they were born, the babies probably joined their mother's group and swam with the other ichthyosaurs for safety.

CARNOTAURUS



Carnotaurus kicks up a cloud of dust as it launches a surprise attack on a harmless sauropod. The long-necked plant-eater looks round in surprise, but it will be very lucky to escape from this ferocious carnosaur. *Carnotaurus* already has his jaws open, ready to sink its knife-like teeth into the gentle giant's flesh.

3-D Gallery

20

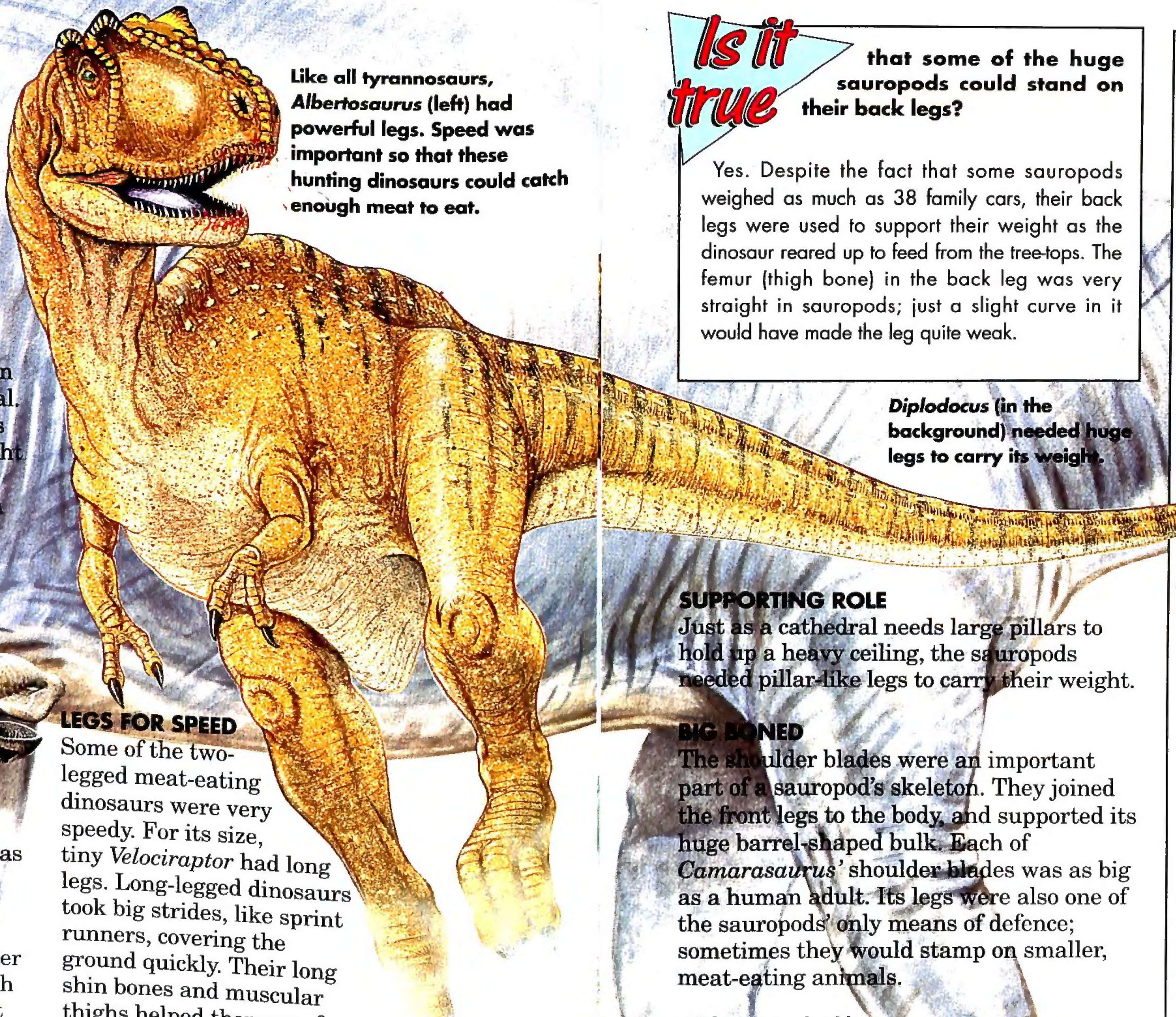
KRITOSAURUS

- Duckbilled herbivore
- Lived 78 – 68 million years ago in North and South America
- Measured 9m long
- Ate plants

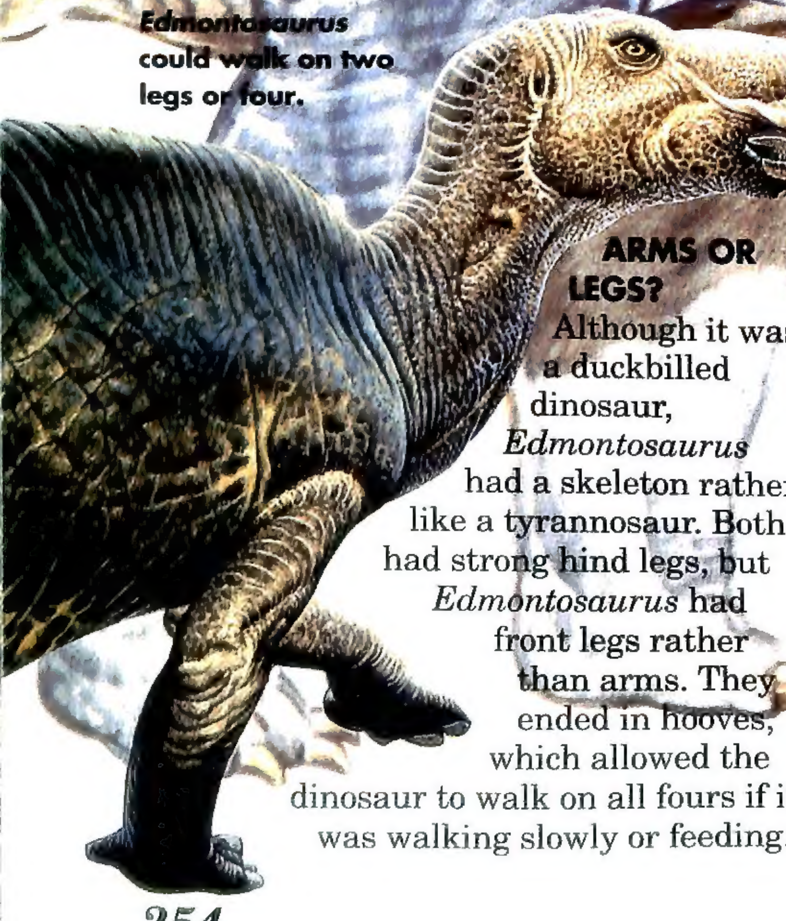
Legs

Dinosaur legs had to support some of the largest animals that ever walked the Earth. Some legs were as thick as tree trunks, while others were long, shapely and muscular.

Dinosaurs were different from any other prehistoric animal. They were the first animals to move about with their legs held straight beneath their bodies. Despite this link between all dinosaurs, their legs came in many different shapes and sizes, to suit their different ways of life.



Like all tyrannosaurs, *Albertosaurus* (left) had powerful legs. Speed was important so that these hunting dinosaurs could catch enough meat to eat.



***Edmontosaurus* could walk on two legs or four.**

ARMS OR LEGS?

Although it was a duckbilled dinosaur, *Edmontosaurus* had a skeleton rather like a tyrannosaur. Both had strong hind legs, but *Edmontosaurus* had front legs rather than arms. They ended in hooves, which allowed the dinosaur to walk on all fours if it was walking slowly or feeding.

LEGS FOR SPEED

Some of the two-legged meat-eating dinosaurs were very speedy. For its size, tiny *Velociraptor* had long legs. Long-legged dinosaurs took big strides, like sprint runners, covering the ground quickly. Their long shin bones and muscular thighs helped them run fast.

The big meat-eaters also walked on two legs and could move at quite a rate if they were chasing their prey. Tyrannosaurs, such as *Albertosaurus*, had powerful legs to support their bodies and pound after prey.

Is it true that some of the huge sauropods could stand on their back legs?

Yes. Despite the fact that some sauropods weighed as much as 38 family cars, their back legs were used to support their weight as the dinosaur reared up to feed from the tree-tops. The femur (thigh bone) in the back leg was very straight in sauropods; just a slight curve in it would have made the leg quite weak.

***Diplodocus* (in the background) needed huge legs to carry its weight.**

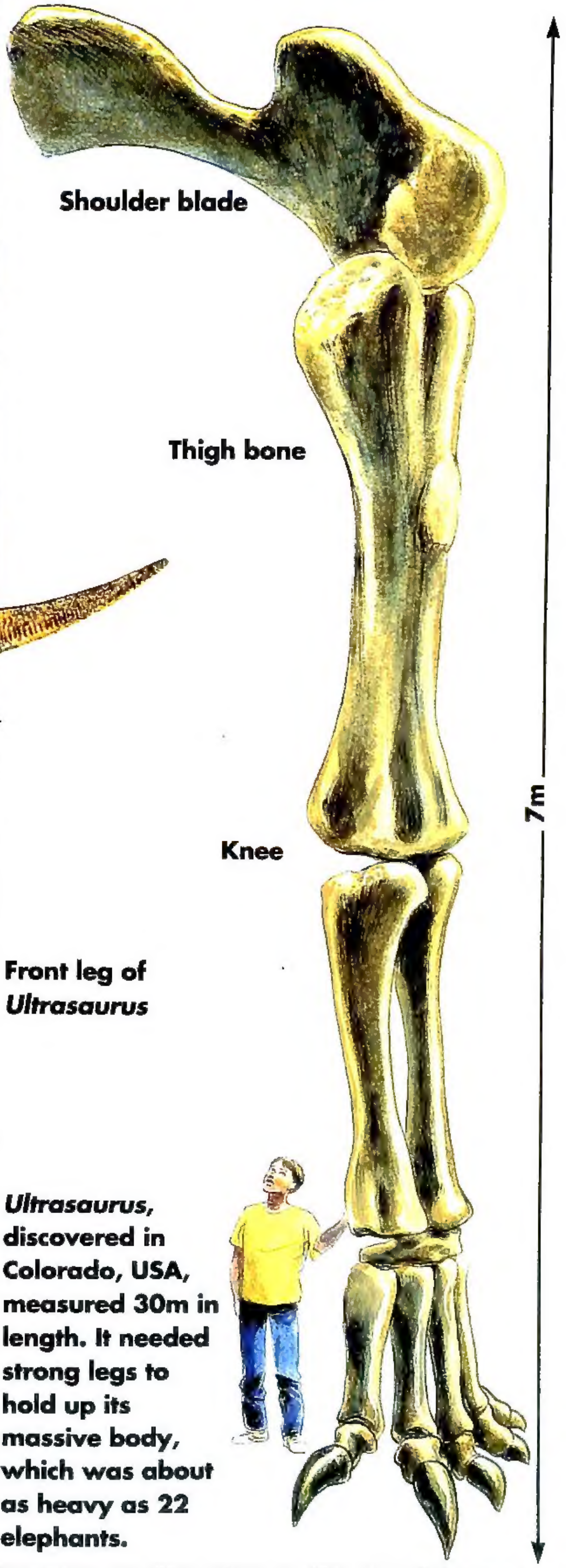
SUPPORTING ROLE

Just as a cathedral needs large pillars to hold up a heavy ceiling, the sauropods needed pillar-like legs to carry their weight.

BIG BONED

The shoulder blades were an important part of a sauropod's skeleton. They joined the front legs to the body, and supported its huge barrel-shaped bulk. Each of *Camarasaurus*' shoulder blades was as big as a human adult. Its legs were also one of the sauropods' only means of defence; sometimes they would stamp on smaller, meat-eating animals.

***Velociraptor* had long and muscular legs built for speed.**



Front leg of *Ultrasaurus*

***Ultrasaurus*, discovered in Colorado, USA, measured 30m in length. It needed strong legs to hold up its massive body, which was about as heavy as 22 elephants.**

Dollo's discoveries

One man's study of *Iguanodon* gave the first real picture of the giant plant-eater and for the first time described how a dinosaur might have lived.

Louis Dollo was able to do something most dinosaur experts only dream about. As the palaeontologist in charge of the fossil finds in the Bernissart coal mine in 1878, he could study the complete skeletons of no less than 39 *Iguanodon*. It was the chance of a lifetime and he devoted over 40 years – most of his working life – to it.

IN WITH THE NEW

Scientists were starting to challenge the idea that dinosaurs were lumbering, elephant-like creatures. Some experts believed they were livelier and more bird-like. Dollo agreed with these new theories and reconstructed the skeletons of *Iguanodon* showing the dinosaur upright.

LIVING ANIMALS

In his efforts to give a life-like picture of *Iguanodon*, Dollo studied certain living animals. He dissected (cut open and studied) birds that do not fly, such as the emu. Dollo did this to try to discover how the dinosaur might have moved. He also made careful drawings of modern-day reptiles such as chameleons (a type of lizard) and alligators in order to find out how *Iguanodon* may have fed.

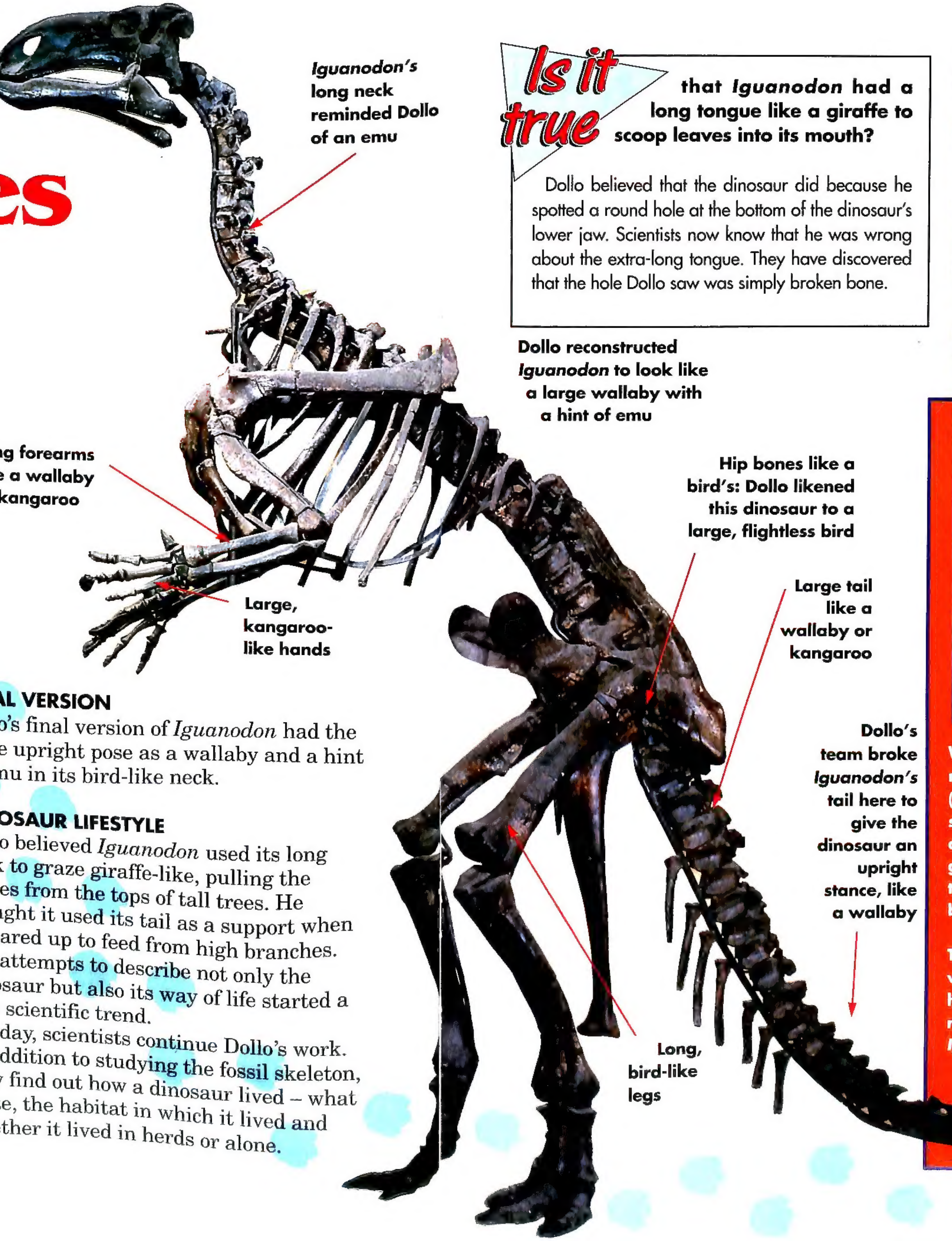
FINAL VERSION

Dollo's final version of *Iguanodon* had the same upright pose as a wallaby and a hint of emu in its bird-like neck.

DINOSAUR LIFESTYLE

Dollo believed *Iguanodon* used its long neck to graze giraffe-like, pulling the leaves from the tops of tall trees. He thought it used its tail as a support when it reared up to feed from high branches. His attempts to describe not only the dinosaur but also its way of life started a new scientific trend.

Today, scientists continue Dollo's work. In addition to studying the fossil skeleton, they find out how a dinosaur lived – what it ate, the habitat in which it lived and whether it lived in herds or alone.



Dollo reconstructed *Iguanodon* to look like a large wallaby with a hint of emu

***Iguanodon's* long neck reminded Dollo of an emu**

Long forearms like a wallaby or kangaroo

Large, kangaroo-like hands

Hip bones like a bird's: Dollo likened this dinosaur to a large, flightless bird

Large tail like a wallaby or kangaroo

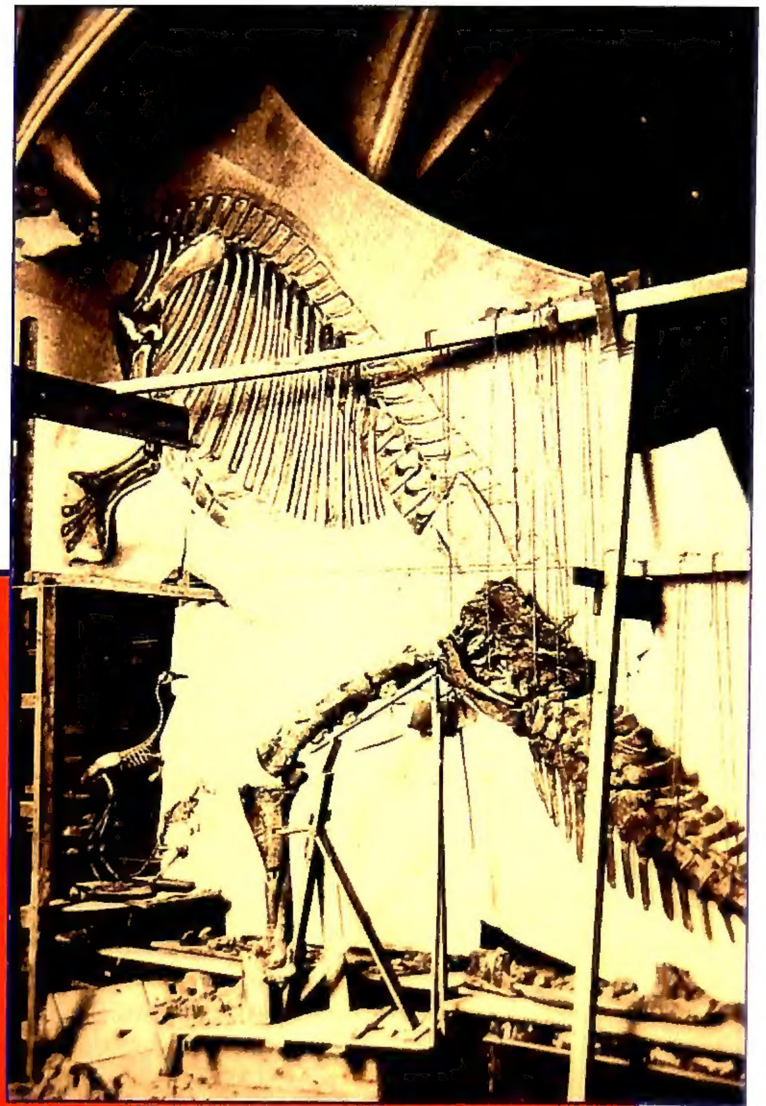
Dollo's team broke *Iguanodon's* tail here to give the dinosaur an upright stance, like a wallaby

Long, bird-like legs

Is it true

that *Iguanodon* had a long tongue like a giraffe to scoop leaves into its mouth?

Dollo believed that the dinosaur did because he spotted a round hole at the bottom of the dinosaur's lower jaw. Scientists now know that he was wrong about the extra-long tongue. They have discovered that the hole Dollo saw was simply broken bone.



When Dollo first reconstructed *Iguanodon* (above), he used the skeletons of an emu and a wallaby as a guide. You can just see their skeletons in the background.

The upright pose of a wallaby (right) helped Dollo to reconstruct *Iguanodon*.

Iguanodon reborn

Discoveries made about *Iguanodon* today have led to a very different idea of how it looked and moved. What were the clues that led to a new look for *Iguanodon*?

David Norman was the first modern palaeontologist to re-examine all the facts about *Iguanodon* in detail. He studied its skeleton, and looked again at all Dollo's evidence. His careful detective work led to a major discovery: the dinosaur was not, as Dollo had thought, an animal that always walked upright on two legs, but one that moved about on all fours most of the time.

IT'S A FACT

ARTIST'S COLOURS

Thanks to the scientists who have studied *Iguanodon*, we have a good idea what it looked like and how it moved. But we still do not know what colour the dinosaur's skin was. We will probably never know as no trace of the colour of *Iguanodon's* skin has ever been found. Each artist who draws *Iguanodon* may colour it differently.

CLUE 1

The tail was held out straight from the body. This would have tilted *Iguanodon's* body forward and downward. It was a very different position from the upright pose that Dollo gave to his reconstructions. Close study of Dollo's skeletons show that the tails had been broken by the reconstruction team to give the dinosaurs a more upright, wallaby-like appearance.

CLUE 2

The 'hands' were made for walking. With the body tilted forward, the 'hands' could touch the ground more easily. The middle three fingers have joints which allow them to be bent backwards in the same way as the toes of the foot. They also end in very broad, flattened claws, shaped like hooves. So *Iguanodon* must have put them to the ground and walked on all fours.

CLUE 3

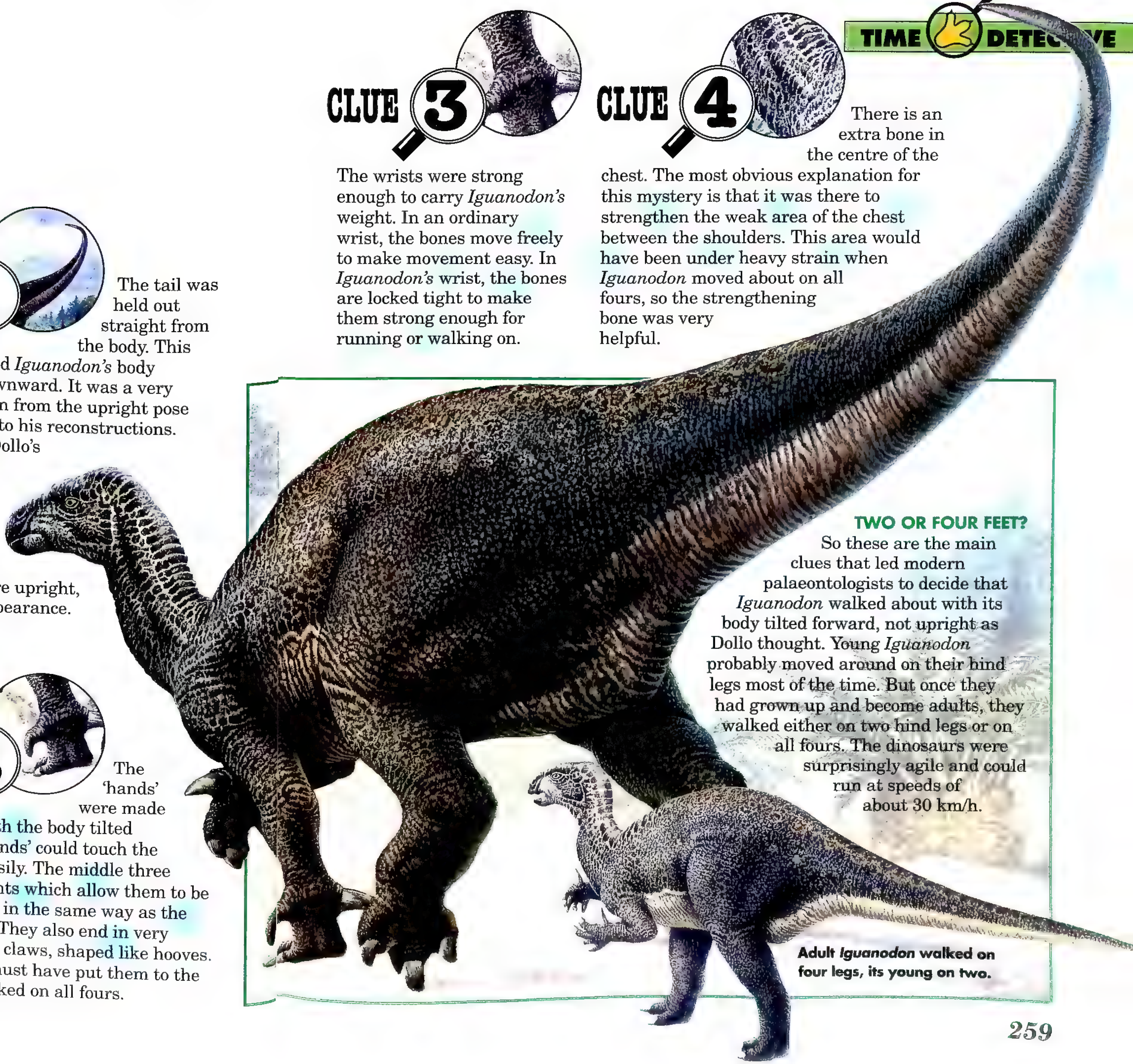
The wrists were strong enough to carry *Iguanodon's* weight. In an ordinary wrist, the bones move freely to make movement easy. In *Iguanodon's* wrist, the bones are locked tight to make them strong enough for running or walking on.

CLUE 4

There is an extra bone in the centre of the chest. The most obvious explanation for this mystery is that it was there to strengthen the weak area of the chest between the shoulders. This area would have been under heavy strain when *Iguanodon* moved about on all fours, so the strengthening bone was very helpful.

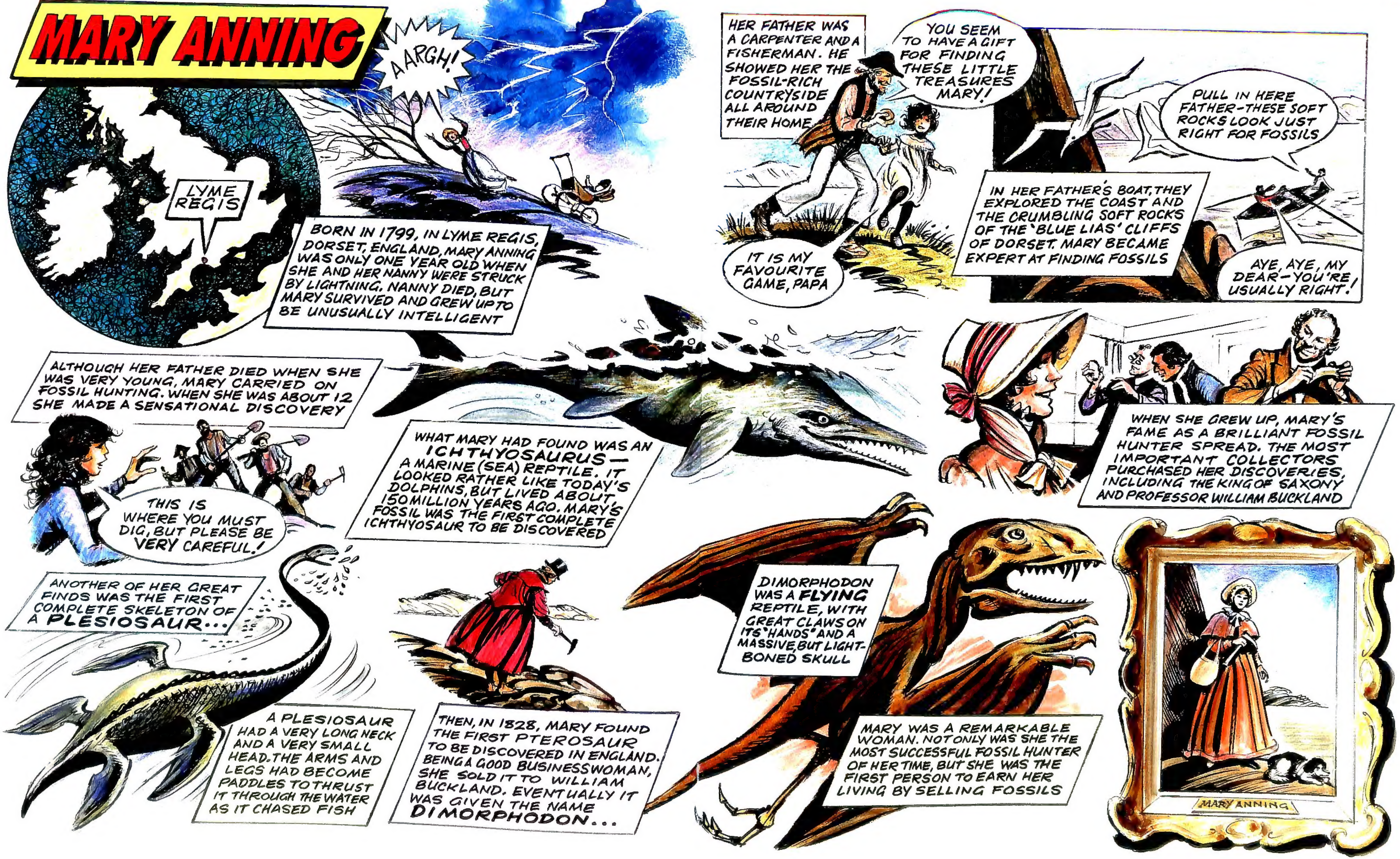
TWO OR FOUR FEET?

So these are the main clues that led modern palaeontologists to decide that *Iguanodon* walked about with its body tilted forward, not upright as Dollo thought. Young *Iguanodon* probably moved around on their hind legs most of the time. But once they had grown up and become adults, they walked either on two hind legs or on all fours. The dinosaurs were surprisingly agile and could run at speeds of about 30 km/h.



Adult *Iguanodon* walked on four legs, its young on two.

MARY ANNING



AARGH!
LYME REGIS

BORN IN 1799, IN LYME REGIS, DORSET, ENGLAND, MARY ANNING WAS ONLY ONE YEAR OLD WHEN SHE AND HER NANNY WERE STRUCK BY LIGHTNING. NANNY DIED, BUT MARY SURVIVED AND GREW UP TO BE UNUSUALLY INTELLIGENT

HER FATHER WAS A CARPENTER AND A FISHERMAN. HE SHOWED HER THE FOSSIL-RICH COUNTRYSIDE ALL AROUND THEIR HOME

YOU SEEM TO HAVE A GIFT FOR FINDING THESE LITTLE TREASURES MARY!
IT IS MY FAVOURITE GAME, PAPA
PULL IN HERE FATHER–THESE SOFT ROCKS LOOK JUST RIGHT FOR FOSSILS

IN HER FATHER'S BOAT, THEY EXPLORED THE COAST AND THE CRUMBLING SOFT ROCKS OF THE 'BLUE LIAS' CLIFFS OF DORSET. MARY BECAME EXPERT AT FINDING FOSSILS

ALTHOUGH HER FATHER DIED WHEN SHE WAS VERY YOUNG, MARY CARRIED ON FOSSIL HUNTING. WHEN SHE WAS ABOUT 12 SHE MADE A SENSATIONAL DISCOVERY

WHAT MARY HAD FOUND WAS AN **ICHTHYOSAURUS**— A MARINE (SEA) REPTILE. IT LOOKED RATHER LIKE TODAY'S DOLPHINS, BUT LIVED ABOUT 150 MILLION YEARS AGO. MARY'S FOSSIL WAS THE FIRST COMPLETE ICHTHYOSAUR TO BE DISCOVERED

WHEN SHE GREW UP, MARY'S FAME AS A BRILLIANT FOSSIL HUNTER SPREAD. THE MOST IMPORTANT COLLECTORS PURCHASED HER DISCOVERIES, INCLUDING THE KING OF SAXONY AND PROFESSOR WILLIAM BUCKLAND

ANOTHER OF HER GREAT FINDS WAS THE FIRST COMPLETE SKELETON OF A **PLESIOSAUR**...

A PLESIOSAUR HAD A VERY LONG NECK AND A VERY SMALL HEAD. THE ARMS AND LEGS HAD BECOME PADDLES TO THRUST IT THROUGH THE WATER AS IT CHASED FISH

THEN, IN 1828, MARY FOUND THE FIRST PTEROSAUR TO BE DISCOVERED IN ENGLAND. BEING A GOOD BUSINESSWOMAN, SHE SOLD IT TO WILLIAM BUCKLAND. EVENTUALLY IT WAS GIVEN THE NAME **DIMORPHODON**...

DIMORPHODON WAS A **FLYING** REPTILE, WITH GREAT CLAWS ON ITS 'HANDS' AND A MASSIVE, BUT LIGHT-BONED SKULL

MARY WAS A REMARKABLE WOMAN. NOT ONLY WAS SHE THE MOST SUCCESSFUL FOSSIL HUNTER OF HER TIME, BUT SHE WAS THE FIRST PERSON TO EARN HER LIVING BY SELLING FOSSILS

Dino Fact File

Big eggs

Dinosaur eggs had to be strong enough to protect the growing baby, but not so strong as to stop it hatching. The largest dinosaur egg belonged to Hypselosaurus. It was about the size of a rugby ball – measuring 30cm in length, 25cm in diameter and weighing about 7kg, but its shell was only 0.5cm thick.

1 How big was *Camarasaurus'* shoulder blade?
a) as big as a man
b) as big as a car
c) as big as tennis court

2 What was *Lambeosaurus'* crest shaped like?
a) a dinner plate
b) a mitten
c) a boomerang

3 Which of these statements is not true?
a) ichthyosaurs could breathe under water
b) ichthyosaurs gave birth to live young under water
c) ichthyosaurs were good swimmers

4 Where was *Carnotaurus* found?
a) in Argentina
b) in Chile
c) in Brazil

5 How long was the biggest known ichthyosaur?
a) as long as one rhinoceros
b) as long as a dolphin
c) as long as a container lorry

6 What were the stones in *Massospondylus'* stomach used for?
a) to help it to digest its food
b) to weigh the dinosaur down in strong winds
c) it ate them by mistake

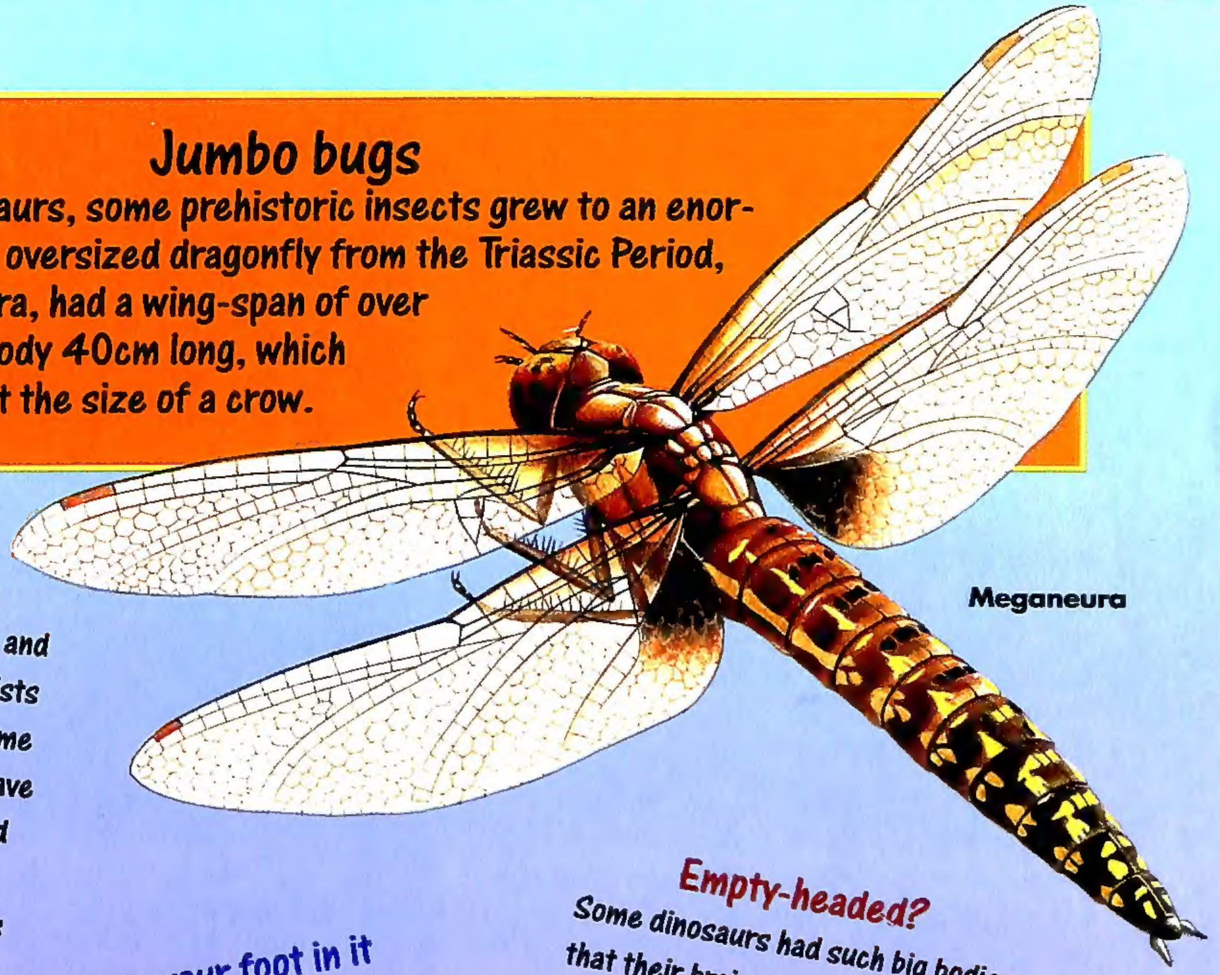
7 Which animal did *Damalasaurus* look like?
a) a hippopotamus
b) a shrew
c) a giraffe

8 Which part of *Deinocheirus'* body has been found?
a) a pair of feet
b) a pelvis
c) a pair of arms

9 Why was *Carnotaurus* called 'meat-eating bull'?
a) it ate bulls
b) it had a small tail like a bull
c) it had a powerful bull-like head and ate meat

Jumbo bugs

Like the dinosaurs, some prehistoric insects grew to an enormous size. One oversized dragonfly from the Triassic Period, called Meganeura, had a wing-span of over 75cm and a body 40cm long, which made it about the size of a crow.



Meganeura

Old age

After studying the growth rings in some of the bones and teeth of dinosaurs, scientists can estimate their age. Some sauropods are thought to have been at least 120 years old when they died, but they could have been as much as 200 years old.

Putting your foot in it

The largest known dinosaur footprints were discovered in Argentina. They were probably left by a herd of gigantic Antarctosaurus as they crossed a large mud flat. The imprints left by their hind feet measured up to 1m in diameter.

Empty-headed?

Some dinosaurs had such big bodies that their brains appear tiny in comparison. An Apatosaurus' brain weighed just 0.001% of its body weight, compared with that of a human brain which weighs 2.5% of its weight. But dinosaurs were not stupid creatures. They could move, smell, hear and see well.

Long arm of the claw

Therizinosaurus had the longest arms of any known dinosaur, reaching a length of 2.7m. At the end of each impressive arm were enormous claws, measuring up to 80cm. Despite these awesome-looking weapons, Therizinosaurus was probably a plant-eater and used its claws to reach high branches and pull them down to its mouth.

10 When did *Lambeosaurus* live?
a) in the Cretaceous Period
b) in the Jurassic Period
c) in the Triassic Period

Answers to the questions on inside back cover

A to Z OF DINOSAURS

DA – DE

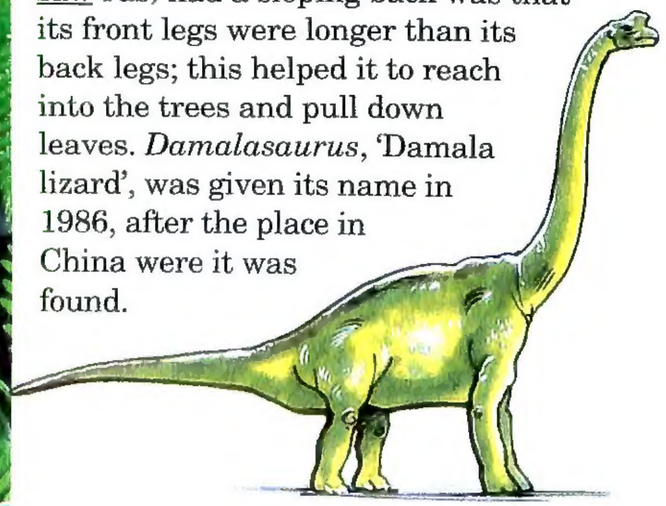
D

DACENTRURUS — 150 MYA

Dacentrurus (da-sen-troo-rus) means 'pointed tail'. Bones from this dinosaur were first found in England in the 1870s. *Dacentrurus* had a double row of tall spines running along its back and tail. It was over 4m long, with a small head and a brain about the same size as a dog's. Experts do not know its exact length, but they have a good idea of how wide it was; its pelvic bone is 1.5m wide. *Dacentrurus* walked on all fours and ate plants. Since the 1870s, more examples of this dinosaur have been found in France and Portugal.

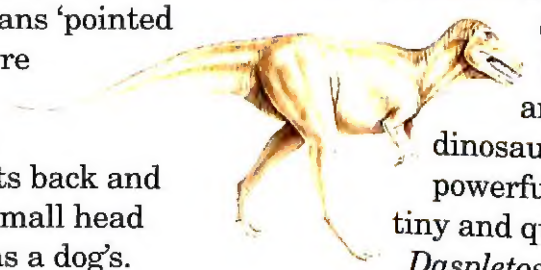
DAMALASAURUS — 140 MYA

This large plant-eating dinosaur lived in the Jurassic Period. It looked rather like a giant giraffe with its long neck and sloping back. The reason that *Damalasaurus* (da-mal-a-saw-rus) had a sloping back was that its front legs were longer than its back legs; this helped it to reach into the trees and pull down leaves. *Damalasaurus*, 'Damala lizard', was given its name in 1986, after the place in China were it was found.



DASPLETOSAURUS — 75 MYA

This huge carnivore had a body longer than two cars. Its massive head was lined with dagger-like teeth to help it eat large animals. Although this dinosaur walked on two powerful legs, its arms were tiny and quite weak. *Daspletosaurus* (da-spleet-oh-saw-rus) was first found in Alberta, Canada, in 1921. Its name means 'frightful lizard'.

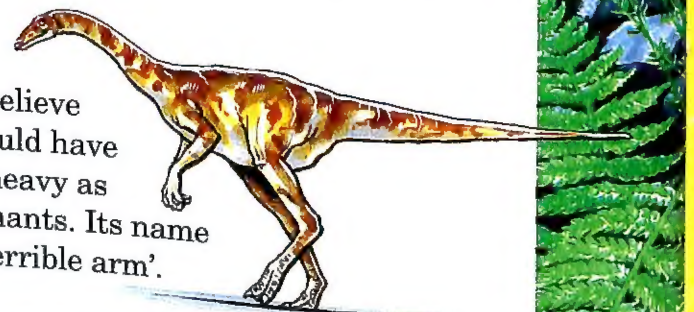


DATOUSAURUS — 160 MYA

Datousaurus (da-too-saw-rus) was found in southern China. Its name means 'Datou lizard' and was named after the place where it was found. This plant-eating dinosaur had a strong skull with spoon-shaped teeth. It had a long neck and tail and walked on four legs.

DEINOCHEIRUS — 70 MYA

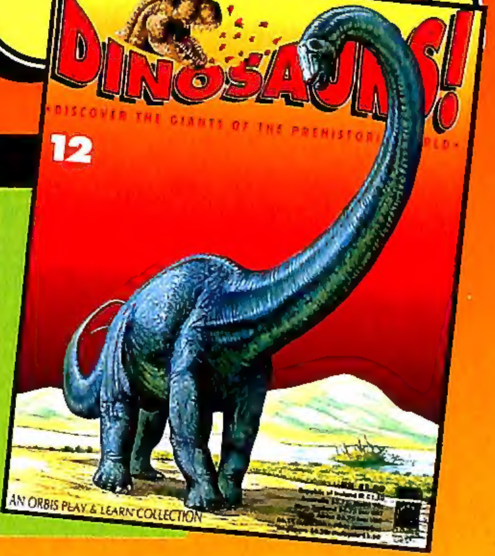
In 1965, a pair of giant arms were found in the Gobi Desert, Mongolia. Each arm was more than 2.5m long (more than the height of a man) with 25cm claws. Scientists are not sure what *Deinocheirus* (dine-oh-kire-us) looked like. Some experts believe that it could have been as heavy as two elephants. Its name means 'terrible arm'.



MYA = MILLION YEARS AGO

COMING IN PART 12 OF

DINOSAURS!


DINOSAURS!
DISCOVER THE GIANTS OF THE PREHISTORIC WORLD
12
AN ORBIS PLAY & LEARN COLLECTION

Meet the roof lizards, with their spiked backs and tails, in TIME DETECTIVE. AND *Diplodocus*, *Kentrosaurus* and *Hypsilophodon* are all in IDENTIKIT.

PLUS

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THE DINOSAURS! POSTER COLLECTION

Have you ever wanted to fill your room with dinosaurs? Now you have your chance – with the *Dinosaurs!* POSTER COLLECTION. Each poster is a 820 x 570mm (nearly eight times the size of this page) and features a superb dinosaur artwork. You'll find facts and figures about the dinosaur on the back – PLUS a look at some other prehistoric animals. The fifth poster is horned *Torosaurus*

ANSWERS TO DINO FACT FILE QUESTIONS: 1. a, 2. b, 3. a, 4. a, 5. c, 6. a, 7. c, 8. c, 9. c, 10. a

ASK THE EXPERT

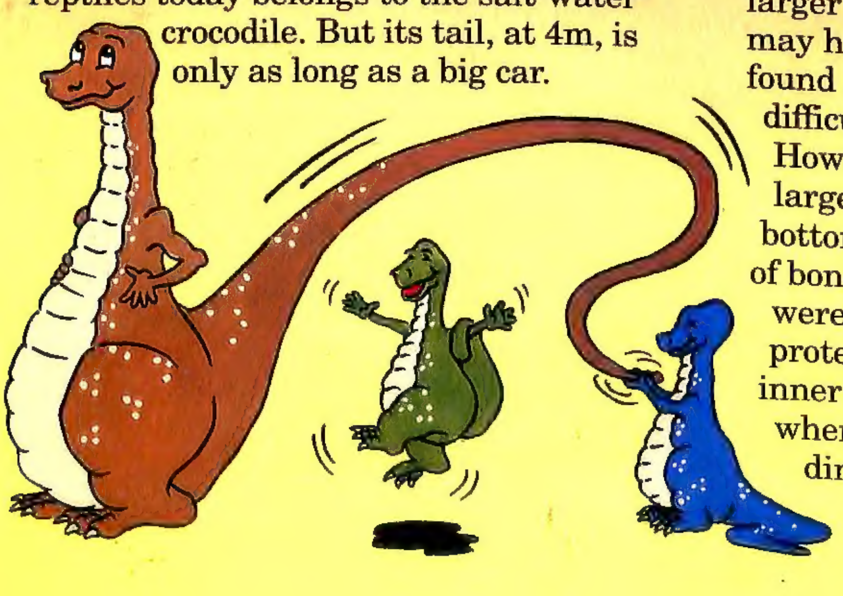
Dr. David Norman of Cambridge University answers your dinosaur questions

How long did it take for a dinosaur egg to hatch?

We can only guess the answer to this question. Some dinosaurs, such as *Maiasaura*, spent their lives travelling, but they probably laid their eggs in the same place every year. It may have taken *Maiasaura* only a few weeks to hatch. This gave the young plenty of time to mature enough in time to join the herd before it migrated to a new feeding ground.

Which dinosaur had the longest tail?

Diplodocus had the longest tail of all dinosaurs – it was 11m long. The end of the tail was quite thin, and *Diplodocus* may have used it like a whip to scare off or attack predators. The longest tail among reptiles today belongs to the salt-water crocodile. But its tail, at 4m, is only as long as a big car.



Did dinosaurs live in caves?

Most dinosaurs were probably too big to have lived in caves. One dinosaur expert thinks that some small dinosaurs retreated to burrows during the dry season, but the evidence to prove this is not very strong.

Did dinosaurs lie down when they went to sleep?

Nobody knows the answer to this question. The smaller dinosaurs lay down quite easily, but the larger ones may have found it more difficult. However, *T rex* had large, curved bones at the bottom of its pelvis and a long row of bones beneath its ribs. These bones were there to protect its inner organs when the dinosaur lay down.